

Emission Inventory Basics & Collecting Data

WRAP Regional Haze Technical Analysis Meeting

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Overview

- Basic Emission Inventory Calculations
 - Activity Data
 - Emission Factors
 - Uncertainty
- Collect Activity Data
 - Developing Surveys
 - Examples of Surveys

Calculating Emissions

Emission Factor x Activity Level = Emissions

Calculating Emissions

- Emission Factors
 - Mass of pollutant (grams, pounds, etc.) produced per unit of activity (hours, gallons burned, miles traveled, etc.)
 - Factors vary by pollutant, equipment/source
 - Find in Models, National Tables, Source Tests, etc.
 - Factors can be Alaska specific
 - Unit conversions are sometimes needed

Example Emission Factors

- Cars – grams of pollutant per mile traveled
- Power plant – lbs of pollutant per gallon of fuel burned
- Wood stove – lbs of pollutant per ton of wood burned
- Marine outboard – grams of pollutant per horsepower-hour

Calculating Emissions (Example)

CAR

- Determine emissions of Carbon Monoxide (CO) for one car for one day:
 - Emission Factor comes from MOBILE model

Emission Factor x Activity Level = Emissions

3.2 grams CO x Activity Level = Emissions
mile traveled

Calculating Emissions

- How to Determine Activity Levels
 - Survey data
 - Industry
 - Government agencies
 - Surrogates
 - EPA National Defaults
- Local activity data is very valuable

Example Activity Levels

- Cars – Number of vehicles of a certain type, Vehicle Miles Traveled (get from transportation agency)
- Wood Stoves – Number of wood stoves, Tons of wood burned
- Power Plant – Gallons of fuel burned
- Marine Outboard – Number of outboards of a certain size, Hours operated, gallons of fuel burned

Calculating Emissions (Example)

CAR

Determine emissions of Carbon Monoxide (CO) for one car for one day:

- Miles traveled could be from personal knowledge, local transportation agency

Emission Factor x Activity Level = Emissions

$$\frac{3.2 \text{ grams CO}}{\text{mile traveled}} \times \frac{20 \text{ miles}}{\text{day}} = \frac{64 \text{ grams CO}}{\text{day}}$$

Emission Data Is Uncertain

- Emission calculations are estimates
- Uncertainty in emission factors varies greatly
 - Cold climate increases uncertainty
- Activity information is often uncertain
 - Often best guess is all that is available
 - Local data is preferred
- Emissions models are uncertain

Collecting Local Activity Data

- Things to consider in developing surveys
 - What pollution sources are you trying to look at?
 - What activity data fits with the emission factor?
 - Who will you need to survey to get the information?
 - How much effort is involved in relation to the importance of the pollution source?
 - How can you collect data consistently?
 - What time of year should you collect data?

WRAP Representative Community Emission Inventory Project

- Project looking at 12-15 small to mid-size Alaska communities
- Project will provide emissions for participating communities as well as estimates that can be used to expand estimates to broader regions.
- Locals are collecting activity data using survey tools
- Contractor is preparing emission estimates from the local data

Examples of Survey Tools from WRAP Alaska Representative Community EI Project

- Summer residential survey
- Winter residential survey
- Non-residential surveys

Uses of Representative Community EI Project Data

- Help to determine air pollutants of concern for a village
- Help to determine amount of village fuel use
- Develop fuel conservation or ways to manage fuel needs
- Ensures accurate representation of village emissions data

Uses of Representative Community EI Data cont.

- Collect baseline data
- Air quality planning
- Collect air quality trends data
 - Indicator of changes in air quality

Survey Discussion

- What differences do you see between the summer and winter surveys?
- Why is it helpful to tailor the survey to a season?
- What are some advantages to collecting data at different times of the year?
- Why is it important to collect data in a consistent way?